Screening for Suicide Risk in Adults: A Summary of the Evidence for the U.S. Preventive Services Task Force

Bradley N. Gaynes, MD, MPH; Suzanne L. West, PhD; Carol A. Ford, MD; Paul S. Frame, MD; Jonathan Klein, MD, MPH; Kathleen N. Lohr, PhD

Suicide is a major public health problem in the United States. In 2001, suicide was the 11th leading cause of death in the United States, accounting for approximately 30,000 deaths with an age-adjusted rate of 10.7 per 100,000 persons.[1] Suicide accounts for 1.3% of total deaths, more than double the number due to HIV infection and AIDS.[2] It is the seventh leading cause of years of potential life lost, surpassing diabetes, liver disease, and HIV infection.[1] Annually, approximately 500,000 individuals require emergency department treatment in U.S. medical centers following attempted suicide.[3] One of every 6 young adults describes having suicidal ideation at some point in their lives, and 5.5% report ever having made a suicide attempt.[4] The public health significance of this problem was underscored by *The Surgeon General's Call to Action to Prevent Suicide*,[3] which proposed completion of a National Strategy for Suicide Prevention.[5]

Relevant demographic risk factors have been identified. Individuals aged 65 and older are at the highest risk for completed suicide; white men aged 85 and older have an especially high rate (59/100,000).[5] Suicide also affects adolescent and young adults; it is the third leading cause of death among persons aged 15 to 24 (10.3/100,000), following unintentional injuries and homicide.[1] Rates of suicide attempts and completions differ by sex; men have a higher rate of suicide completion, whereas women have a higher rate of attempts.[6] Finally, suicide behaviors vary widely by race and ethnicity. Nearly 75% of all completed suicides are by white males,[2] who have a 2-fold higher risk for suicide than black men (11.7/100,000 vs 5.5/100,000).[1]

Clinical risk factors have also been identified. Suicide is closely related to psychiatric illness. More than 90% of those who complete suicide have a diagnosable psychiatric illness at the time of death, usually depression, alcohol abuse, or both.[7] Hopelessness, often present in those with severe depressive illness and a history of previous suicide attempts are particularly strong and independent

From the University of North Carolina at Chapel Hill (Gaynes, West, Ford, Lohr), Chapel Hill, NC; Tri-County Family Medicine (Frame), Cohocton, NY; University of Rochester (Klein), Rochester, NY; RTI International (Lohr), Research Triangle Park, NC.

This study was conducted by RTI International–University of North Carolina Evidence-based Practice Center under contract to the Agency for Healthcare Research and Quality (AHRQ) (Contract No. 290-97-0011), Task Order Number 3, Rockville, MD.

Address correspondence to Bradley N. Gaynes, MD, MPH, Department of Psychiatry, University of North Carolina, CB # 7160, Chapel Hill, NC 27599. E-mail: bgaynes@med.unc.edu.

Reprints are available from the AHRQ Web site (www.preventiveservices.ahrq.gov) or through the National Guideline Clearinghouse™ (www.guideline.gov). Print copies of this article, along with other USPSTF summaries of the evidence and recommendation statements, are available by subscription to the *Guide to Clinical Preventive Services, Third Edition: Periodic Updates*. The subscription costs $60 and is available through the AHRQ Publications Clearinghouse (call 1-800-358-9295, or e-mail ahrqpubs@ahrq.gov).

This first appeared in *Ann Intern Med*. 2004;140:822–835.

prospective risk factors for a suicide.[8] Although prior suicide attempts are a key risk factor, two-thirds of suicides occur on the first attempt,[9] and suicide attempts remain substantially more common than completed suicides by a factor between 10 and 20.[7] Other identified risk factors for completed suicide include being widowed or divorced, living alone, having a recent harmful event (such as job loss or death of loved one), having severe anxiety, having a chronic medical illness (especially a central nervous system disorder), and having a family history of suicide attempts or completions (Hirschfeld and Russell[7] and Mann[9] provide more detailed reviews).

Primary care physicians have a key role in identifying and managing suicidal tendency. Patients endorsing suicidal ideation, a key factor in the assessment of suicide risk, are not uncommon in primary care; between 2% and 3% of primary care patients report suicidal ideation in the previous month.[10,11] Furthermore, most patients completing suicide have recently visited their primary care physician. Approximately one-half to two-thirds of individuals who commit suicide visit physicians within 1 month of taking their lives; 10% to 40% visit in the week before.[12–15]

The clinical management of suicide risk is complicated. Suicide is a rare event. It has a low prevalence in the general population (0.01%)[16] and, despite a 10-fold increase in adults with depression, most depressed patients (99.9%) do not commit suicide.[17] As a result, many clinical trials on the management of suicide risk have focused on high-risk patients, such as those with a history of deliberate self-harm.

Deliberate self-harm, understood as an intentionally initiated act of self-harm with nonfatal outcome (including self-poisoning and self-injury), encompasses terms such as *attempted suicide* and *parasuicide*.[18] Deliberate self-harm is not synonymous with attempted suicide. Attempted suicide, understood as a self-initiated act with the intent of ending one's life, is only a single example of deliberate self-harm. Still, deliberate self-harm is a recurrent behavior with important long-term risks. Between 15% and 23% of patients who are seen for deliberate self-harm will be seen for treatment of a subsequent episode within 1 year[19] and are at high risk for repeat deliberate self-harm in the weeks following an episode.[20] Of those with an episode of deliberate self-harm, 3% to 5% die by suicide within 5 to 10 years.[21] Identification of deliberate self-harm is relevant to primary care practice, since two-thirds of patients who deliberately harm themselves visit their general practitioner within 12 weeks of the episode.[22] Patients with borderline personality disorder are at increased risk for deliberate self-harm, with groups from psychiatric and primary care settings having similar self-harm profiles.[23]

Given the Surgeon General's call to action, clarification of the available evidence base guiding the clinical management of suicide risk is especially pertinent. As part of the U.S. Preventive Services Task Force (USPSTF) update of its 1996 recommendation,[24] we examined the evidence addressing whether primary care identification and treatment of suicide risk improves outcomes in patients whose risk had previously been unidentified. Our full systematic evidence review set out to answer 8 key questions (see Appendix Figure 1). In this article, we report on the 3 key questions for which we found data meeting our selection criteria: (1) Can a screening test reliably detect suicide risk in primary care populations? (2) For those at risk, does treatment result in decreased suicide attempts or completions? and (3) For those at risk, does treatment result in improved intermediate outcomes (eg, decreased suicidal ideation or depressive severity)?

Methods

Using USPSTF methods,[25] we developed an analytic framework and 8 key questions to guide our literature searches. (Appendix Tables 1–3 and Appendix Figure 1.) Our population of interest was primary care patients with previously unidentified suicide risk.

To identify relevant articles, we searched the MEDLINE® database from 1966 to October 17, 2002, beginning with the terms *suicide* or *suicide, attempted*. We supplemented these sources by using the same search terms in PsycINFO; searching the

Cochrane Collaboration Library; and hand searching the bibliographies of systematic reviews, relevant original articles, and the 1996 edition of the *Guide to Clinical Preventive Services*.[24] We additionally reran searches using *deliberate self-harm* as a search term and identified no further articles. In this paper, we present our findings for studies involving adults.

We found 1 well-conducted, recent systematic review by Hawton et al concerning treatment of deliberate self-harm, which was relevant to reducing suicide attempts or completions, our primary outcome.[18] We found another recent, well-done systematic review relevant to intermediate outcomes.[26] We checked our study results against the studies in these reviews, and we examined in detail only those studies that had not been included in the systematic reviews.

Two of the authors independently reviewed all titles and abstracts. If either reviewer determined that the study met inclusion criteria, we retrieved the full paper for further evaluation. Two of the authors subsequently reviewed the studies to determine final inclusion, adjudicating disagreements by consensus discussion.

A primary reviewer abstracted relevant information into evidence tables. As part of this abstraction, the primary reviewer rated the internal and external validity for each article using criteria developed by the USPSTF Methods Work Group.[25] A second reviewer checked the accuracy of the abstracted information against the original articles, while the first author reviewed all quality ratings to ensure consistency.

We required that screening studies be performed within a primary care setting, but treatment studies could be performed in either primary or specialty care settings. This strategy reflected our idea that screening must be performed in primary care but should suicide risk be identified, a primary care physician could refer patients for subsequent treatment.

For screening studies, inclusion required comparison with a gold standard. For treatment studies, inclusion required that trials report suicide completions, suicide attempts, or suicidal ideation as primary outcomes. We excluded the following: clinical trials targeting patients with chronic psychotic illnesses because these patients would already be identified as having increased suicide risk; randomized controlled trials (RCTs) that did not supply sufficient detail to allow direct comparison of outcomes between intervention and control groups; and cohort studies that did not have either a similar clinical presentation for intervention and control groups or an independent control group.

This research was funded through a contract to the RTI International—University of North Carolina Evidence-based Practice Center from the Agency for Healthcare Research and Quality (AHRQ). Agency staff and Task Force members participated in the study design and reviewed draft and final manuscripts. A more comprehensive report was distributed for review to content experts and revised accordingly before preparation of this manuscript.[27]

Results

Can a Screening Test Reliably Detect Suicide Risk in Primary Care Populations?

Our evaluation identified 1 relevant article assessing an instrument's operating characteristics for identifying suicide risk in primary care.[10] The Symptom-Driven Diagnostic System for Primary Care (SDDS-PC),[28] a 62-item self-report instrument designed to help identify psychiatric illness in primary care settings, contains 3 items assessing suicide risk (all within the past month).[10] Data on suicidal thoughts, plans, and past attempts were systematically collected using a nurse-administered, face-to-face structured interview conducted immediately before the medical visit. The individual operating characteristics of the 3 items were compared with a structured interview for identifying a plan to commit suicide (the gold standard).

"Thoughts of death" had 100% sensitivity, 81% specificity, and 5.9% positive predictive value for detecting patients with a plan to commit suicide.

Endorsing "wishing you were dead" had 92% sensitivity, 93% specificity, and 14% positive predictive value; "feeling suicidal" had 83% sensitivity, 98% specificity, and 30% positive predictive value. Of those "feeling suicidal," 85% had a psychiatric disorder as determined by structured clinical interviews.[29] Only major depression (odds ratio [OR], 33.1; 95% confidence interval [CI], 10.9–99.6) and drug abuse or dependence (OR, 16.7; 95% CI, 3.9–71.4) were independently associated with suicidal ideation. Of note, only 46% of those eligible for this study agreed to participate.

Given the rarity of suicide attempts in the primary care population, finding an accurate screening strategy for suicide risk in a primary care setting is a daunting challenge. This is illustrated by the following hypothetical situation. Consider a screening instrument (eg, endorsing "feeling suicidal") that identifies patients at high risk and has reasonable test characteristics (eg, sensitivity of 80% and specificity of 70%, figures similar to screening tools for depression).[30,31] Apply this tool to a population of 10,000 in which 10 patients will attempt suicide (10-fold more than the 10 in 100,000 persons who will complete suicide), it will produce 8 true-positive results, 2 false-negative results, and 2,997 false-positive results, a positive predictive value of 0.3%. This high proportion of false-positive results could generate a substantial time and cost burden. Using the higher specificity result (98%) from the prior study produces substantially fewer false-positive results (n = 200), but only a slightly improved positive predictive value (3.8%).

Does Treatment Reduce Suicide Attempts or Completions?

We report findings first from RCTs and then from cohort studies. Within each study design section, we provide the evidence stratified by age whenever possible.

Randomized Controlled Trials

All 30 RCTs that met our inclusion criteria[27] involved high-risk groups as identified by a deliberate self-harm episode, a diagnosis of borderline personality disorder, or admission to a psychiatric unit. However, only Motto and Bostrom[32] and Rudd et al[33] identified depressive illness as part of their eligibility criteria, and no studies focused primarily on depressed patients with suicidal ideation. Of the 2 studies directly involving primary care, 1 recruited some of its patients from a primary care setting (although the intervention occurred in a psychiatric outpatient setting)[34] and the other conducted its intervention in a primary care setting.[35]

Trials focusing on adolescents or young adults and elderly adults, the 2 populations of greatest clinical concern, were limited. The included studies involved either adults only or adults and older adolescents but did not differentiate further by age in the analyses; we review them together.

We found no published intervention study for the elderly population. However, the Prevention of Suicide in Primary Care Elderly—Collaborative Trial (PROSPECT) is currently being conducted.[36] PROSPECT aims to determine whether placement of a depression health specialist in primary care practices has a favorable impact on rates of depression, hopelessness, and suicidal ideation in elderly primary care patients with depressive illness. Initial outcomes for the 4- and 8-month follow-up periods were expected in 2003.

We organized our review of the 30 RCTs as follows. Because Hawton et al[18] had systematically reviewed 21 of these trials,[37–57] we first briefly summarize the results of their meta-analysis (Table 1). We then provide greater detail on the 9 additional RCTs of deliberate self-harm that our literature search identified (Table 2).[32–35,58–63] Two articles[58,59] were from a single trial and are counted as 1 trial. Given the substantial heterogeneity of the populations enrolled, the interventions tested, the length of follow-up periods, and the outcomes measured, we concluded that integrating the new studies into the prior summary was not warranted.

Prior Review of RCTs for Deliberate Self-Harm

Of the 21 studies of adults receiving treatments for deliberate self-harm (Table 1),[37–57] 12 included older adolescents.[37–44,46,47,52,54] Although some trends suggested incremental benefit from certain

interventions compared with usual care, interventions for which more than 1 study was performed produced no statistically significant effects by meta-analysis. The most promising intervention was problem-solving therapy, a short-term, cognitively-oriented psychotherapy. In 5 studies of this intervention versus standard aftercare, the summary OR showed a trend toward decreasing deliberate self-harm (OR, 0.70; 95% CI, 0.45–1.11).[37–41] Of note, both the form and duration of treatment varied considerably within these 5 studies.

Intensive care plus outreach versus standard aftercare (6 studies)[42–47] produced a summary OR of 0.83 (95% CI, 0.61–1.14). Again, the form and duration of treatment varied substantially among the studies. One large trial comparing provision of both physician contact and crisis intervention assistance showed a trend toward a decreased likelihood of repeating deliberate self-harm in favor of the intervention (OR, 0.43; 95% CI, 0.15–1.27) compared with standard care.[48]

Two interventions, each supported by a single study involving a maximum of 20 patients in each group, reported statistically significant reduced repetition of deliberate self-harm. Dialectical behavior therapy (DBT), a comprehensive treatment program developed to treat severely dysfunctional individuals with borderline personality disorders by improving emotional and behavioral management skills, significantly reduced repetition of deliberate self-harm for patients with borderline personality disorder and recent deliberate self-harm compared with standard care (OR, 0.24; 95% CI, 0.06–0.93).[49] Administration of the antipsychotic flupenthixol significantly reduced the proportion of repeated deliberate self-harm for those with a history of at least 2 prior suicide attempts compared with placebo (OR, 0.09; 95% CI, 0.02–0.50).[53]

Additional RCTs of Deliberate Self-Harm

Of the 9 additional studies involving repetition of deliberate self-harm identified in our literature search (Table 2),[32–35,58–63] 2 showed benefit. Guthrie et al found significant benefit from interpersonal psychotherapy, a time-limited method that focuses on resolving current interpersonal problems to improve symptoms, compared with standard care.[60] Patients who presented to an emergency department with deliberate self-harm, but did not require medical or psychiatric hospitalization, were enrolled. Participants were randomized to either 4, 50-minute sessions of interpersonal psychotherapy delivered by nurse therapists in the patient's home, or usual care. Of those eligible (n = 119), 51% participated; those refusing were at a greater suicide risk as indicated by clinical measures. In an intention-to-treat analysis, those in the interpersonal psychotherapy group were less likely to have a repeat episode of deliberate self-harm in the subsequent 6-month period (8.6% vs 27.9%, $P < 0.001$).

Bateman and Fonagy compared psychoanalytically oriented partial hospitalization with standard psychiatric outpatient aftercare for patients with borderline personality disorder.[58,59] Treatment occurred for a maximum of 18 months. Twenty-two patients were initially randomized to each group; analysis was not intention-to-treat. After 18 months of treatment, the percentage of those with suicide attempts within the prior 6 months was significantly lower in the treatment group than in the control group (53% for intervention group, no rate given for control group, but a graph suggests approximately 40% [$P < 0.001$]). At the 36-month follow-up, a significantly smaller proportion of the partial hospitalization group made a suicide attempt compared with the usual care group (18.2% vs 63.2%; no OR calculated; $P < 0.004$).

The remaining 7 studies identified no benefit from interventions (Table 2). In 6 studies in which treatment was provided in the primary care setting, interventions included providing an emergency information card,[62] a letter,[32] outpatient day hospitalization,[33] antidepressant medication,[61] antipsychotic medication,[63] and DBT.[34] All interventions were compared with usual care or placebo (for the 2 medication studies). Of interest, a subgroup analysis in the Evans et al emergency information card study suggested a need to examine the data by whether previous deliberate self-harm had occurred; for those with a history of deliberate self-harm, the intervention increased the likelihood of repeat deliberate self-harm.[62]

Table 1. Randomized Controlled Trials of Interventions to Decrease Deliberate Self-Harm in Adults and Older Adolescents*

Study, Year	Population	Age Range (Yrs)	Intervention and Control Groups
Problem-solving Therapy vs Standard Aftercare			
Gibbons et al, 1978[37]	Southampton, UK Self-poisoning patients with no immediate suicide risk and no formal psychiatric diagnosis	> 17	Intervention: Home-based crisis-oriented problem-solving therapy by social workers over 3 mos Control: Standard aftercare
Hawton et al, 1987[38]	Oxford, UK Deliberate self-poisoning patients who were not in psychiatric care, did not require treatment for alcohol or drug addiction, and did not need inpatient psychiatric care	> 16	Intervention: Outpatient therapy by non-medical clinicians for ≤ 8 sessions Control: Standard aftercare
Salkovskis et al, 1990[39]	Leeds, UK Non-psychotic patients referred by psychiatrist after admission to an emergency department after antidepressant self-poisoning; ≥ 4 on Buglass and Hawton Risk of Repetition Scale or ≥ 2 previous attempts	16–65	Intervention: Home-based therapy by community psychiatric nurse for 5 sessions Control: Standard aftercare
McLeavey et al, 1994[40]	Cork, Ireland Non-psychotic, non-suicidal patients without cognitive impairment and not needing psychiatric inpatient care who were admitted to an emergency department for self-poisoning	15–45	Intervention: Interpersonal problem-solving skills training by trained therapists for approximately 5 sessions Control: Brief problem-solving therapy
Evans et al, 1999[41]	London, UK Patients with self-harm episode in previous 12 mos with a personality disturbance but no alcohol or drug dependence or schizophrenia who were admitted to Paddington, Westminster or Chelsea, Westminister, emergency department	16–50	Intervention: Manual-assisted cognitive-behavioral therapy by trained therapists for 2–6 sessions Control: Standard psychiatric treatment
Overall			
Intensive Care Plus Outreach vs Standard Care			
Chowdhury et al, 1973[42]	Edinburgh, UK Patients with a previous DSH episode admitted for DSH to a general hospital; included patients with psychiatric disturbance, alcohol dependence, and drug addiction	> 16	Intervention: Enhanced aftercare with aggressive outreach and follow-up Control: Standard aftercare

* Adapted from Hawton et al, 2001.[18]

CI, confidence interval; DSH, deliberate self-harm; GHQ, Generalized Health Questionnaire; NR, not reported; OR, odds ratio.

Table 1. Randomized Controlled Trials of Interventions to Decrease Deliberate Self-Harm in Adults and Older Adolescents* (cont)

Follow-up Period (After Enrollment)	Number (%) of Participants with DSH during Follow-up	Odds Ratio (95% CI)
12 mos	Intervention: 27/200 (13.5) Control: 29/200 (14.5)	0.92 (0.52–1.62)
12 mos	Intervention: 3/41 (7.3) Control: 6/39 (15.4)	0.43 (0.10–1.87)
12 mos	Intervention: 3/12 (25.0) Control: 4/8 (50.0)	0.33 (0.05–2.24)
12 mos	Intervention: 2/19 (10.5) Control: 5/20 (25.0)	0.35 (0.06–2.09)
6 mos	Intervention: 10/18 (55.6) Control: 10/14 (71.4)	OR not calculated
	0.70 (0.45–1.11)	
6 mos	Intervention: 17/71 (23.9) Control: 19/84 (22.6)	1.08 (0.51–2.27)

continue

Table 1. Randomized Controlled Trials of Interventions to Decrease Deliberate Self-Harm in Adults and Older Adolescents* (cont)

Study, Year	Population	Age Range (Yrs)	Intervention and Control Groups
Welu, 1977[43]	Pittsburgh, PA Patients admitted to an emergency department for DSH	≥ 16	Intervention: Special outreach program with weekly or bi-weekly contact with trained mental health professionals for 4 mos Control: Standard aftercare
Hawton et al, 1981[44]	Oxford, UK Patients not receiving current psychiatric care or treatment for alcohol or drug addiction admitted to a general hospital after DSH	≥ 15	Intervention: Home-based therapy as often as therapist felt necessary for ≤ 3 mos by mental health professionals Control: Weekly outpatient therapy
Allard et al, 1992[45]	Montreal, Canada Non-sociopathic patients with a recent suicide attempt who presented to hospital for another suicide attempt	NR	Intervention: Enhanced aftercare with aggressive outreach and follow-up by mental health professionals for 12 mos Control: Standard aftercare
Van Heeringen et al, 1995[46]	Gent, Belgium Patients treated in an emergency department after a suicide attempt	≥ 15	Intervention: Enhanced aftercare with aggressive outreach and follow-up by mental health professionals for unspecified period Control: Standard aftercare
van der Sande et al, 1997[47]	Utrecht, the Netherlands Patients without drug or alcohol addiction and obvious psychiatric comorbidity admitted to the hospital after a suicide attempt	≥ 16	Intervention: Brief psychiatric admission with outpatient therapy by mental health professionals and 24-hr hospital access for unspecified period Control: Standard aftercare
Overall			
Emergency Care vs Standard Aftercare			
Morgan et al, 1993[48]	Bristol, UK Patients admitted to the hospital after first DSH episode	Mean age, 30	Intervention: Standard care plus card indicating 24-hr access to mental health professional for 12 mos Control: Standard aftercare
Dialectical Behavior Therapy vs Standard Aftercare			
Linehan et al, 1991[49]	Seattle, WA Female patients with borderline personality disorder and ≥ 2 suicide attempts in last 5 yrs, current suicide attempt within past 8 wks	18–45	Intervention: Dialectical behavioral therapy (individual and group) with mental health professional for 1 yr Control: Standard aftercare
Inpatient Behavior Therapy vs Inpatient Insight-Oriented Therapy			
Liberman and Eckman, 1981[50]	Los Angeles, CA Patients with ≥ 1 suicide attempt who were not psychotic or addicted to alcohol or drugs and were referred by psychiatrist after admission to emergency department for DSH	18–47	Intervention: Inpatient psychiatric treatment with behavior therapy for 10 days Control: Inpatient psychiatric treatment with insight-oriented therapy for 10 days

Table 1. Randomized Controlled Trials of Interventions to Decrease Deliberate Self-Harm in Adults and Older Adolescents* (cont)

Follow-up Period (After Enrollment)	Number (%) of Participants with DSH during Follow-up	Odds Ratio (95% CI)
4 mos	Intervention: 3/62 (4.8) Control: 9/57 (15.8)	0.27 (0.07–1.06)
12 mos	Intervention: 5/48 (10.4) Control: 7/48 (14.6)	0.68 (0.20–2.32)
12 mos	Intervention: 22/63 (34.9) Control: 19/63 (30.2)	1.24 (0.59–2.62)
12 mos	Intervention: 21/196 (10.7) Control: 34/195 (17.4)	0.57 (0.32–1.02)
12 mos	Intervention: 24/140 (17.1) Control: 20/134 (14.9)	1.18 (0.62–2.25)
		0.83 (0.61–1.14)
12 mos	Intervention: 5/101 (5.0) Control: 12/111 (10.8)	0.43 (0.15–1.27)
12 mos	Intervention: 5/19 (26.3) Control: 12/20 (60.0)	0.24 (0.06–0.93)
12 mos	Intervention: 2/12 (16.7) Control: 3/12 (25.0)	0.60 (0.08–4.45)

continue

Table 1. Randomized Controlled Trials of Interventions to Decrease Deliberate Self-Harm in Adults and Older Adolescents* (cont)

Study, Year	Population	Age Range (Yrs)	Intervention and Control Groups
Same Therapist (Continuity of Care) vs Different Therapist (Change of Care)			
Torhorst et al, 1987[51]	Munich, Germany Non-psychotic patients hospitalized after a self-poisoning suicide attempt	NR	Intervention: Outpatient appointment with same therapist as seen in hospital for 3-mo treatment Control: Outpatient appointment with different therapist than seen in hospital for 3-mo treatment
General Hospital Admission vs Discharge			
Waterhouse and Platt, 1990[52]	York, UK Patients without current medical or psychiatric treatment needs admitted to an emergency department for DSH	≥ 16	Intervention: General hospital admission for about 1 day Control: Discharge from hospital
Flupenthixol (Antipsychotic) vs Placebo			
Montgomery et al, 1979[53]	Maidstone, UK Patients with ≥ 2 DSH episodes without overt depression or schizophrenia admitted to a general hospital after a suicide attempt	18–68	Intervention: Monthly intramuscular administration for 6 mos Control: Monthly placebo administration
Antidepressants vs Placebo			
Hirsch et al, 1982[54]	London, UK Patients with a GHQ score ≥ 20 and not on antidepressant or antipsychotic medication and were admitted to a hospital after deliberate self-poisoning	16–65	Intervention: Mianserin or nomifensine therapy for 6 wks Control: Placebo
Montgomery et al, 1983[55]	London, UK Patients with personality disorder and no depression or schizophrenia with previous DSH, admitted after DSH	Mean age, 35.7	Intervention: Mianserin therapy for 6 mos Control: Placebo
Verkes et al, 1998[56]	Leiden, Rotterdam, the Netherlands Patients with repeated DSH without current diagnosis of major depression who were admitted to emergency departments of university hospitals	≥ 18	Intervention: Paroxetine plus psychotherapy (therapy and therapist not described) for 12 mos Control: Placebo plus psychotherapy
Overall			
Long-term Therapy vs Short-term Therapy			
Torhorst et al, 1988[57]	Munich, Germany Patients with repeat DSH without psychosis, current psychiatric treatment, or drug addiction admitted for deliberate self-poisoning episode	NR	Intervention: 1 session per month by a mental health professional for 12 mos Control: 12 weekly therapy sessions by a mental health professional over 3 mos

Table 1. Randomized Controlled Trials of Interventions to Decrease Deliberate Self-Harm in Adults and Older Adolescents* (cont)

Follow-up Period (After Enrollment)	Number (%) of Participants with DSH during Follow-up	Odds Ratio (95% CI)
12 mos	Intervention: 12/68 (17.6) Control: 4/73 (5.5)	3.70 (1.13–12.09)
4 mos	Intervention: 3/38 (7.9) Control: 4/39 (10.3)	0.75 (0.16–3.60)
6 mos	Intervention: 3/14 (21.4) Control: 12/16 (75.0)	0.09 (0.02–0.50)
3 mos	Intervention: 16/76 (21.1) Control: 5/38 (13.2)	1.76 (0.59–5.24)
6 mos	Intervention: 8/17 (47.1) Control: 12/21 (57.1)	0.67 (0.18–2.41)
12 mos	Intervention: 15/46 (32.6) Control: 21/45 (46.7)	0.70 (no CI, $P = 0.12$)
		0.83 (0.47–1.48)
12 mos	Intervention: 9/40 (22.5) Control: 9/40 (22.5)	1.0 (0.35–2.86)

Table 2. Additional Randomized Controlled Trials of Interventions to Reduce Deliberate Self-Harm in Adults and Older Adolescents*

Study, Year	Population	Age Range (Yrs)	Intervention and Control Groups
Interpersonal Psychotherapy vs Standard Aftercare			
Guthrie et al, 2001[60]	Patients presenting to an emergency department with deliberate self-poisoning, but not requiring inpatient psychiatric treatment	18–65	Intervention: Weekly sessions of home-based interpersonal psychotherapy by nurse therapists for 1 mo Control: Standard aftercare
Psychoanalytically Oriented Partial Hospitalization vs Standard Aftercare			
Bateman and Fonagy, 1999,[58] 2001[59]†	Patients with borderline personality disorder who did not have bipolar or psychotic disorder, substance abuse, mental impairment, or organic brain disorder attending a psychiatric clinic	16–65	Intervention: Partial hospitalization on psychiatric unit for 18 mos Control: Standard aftercare for 18 mos
Emergency Care vs Standard Aftercare			
Evans et al, 1999[62] Subgroup analysis dichotomized by prior history of DSH	Bristol, UK Patients referred from several general hospitals for psychiatric evaluation after DSH and who were not considered dangerous to self or others	Adults	Intervention: Card offering 24-hr phone crisis consultation with psychiatrist for 6 mos Control: Standard aftercare
Brief Contact By Letter vs Standard Aftercare			
Motto and Bostrom, 2001[32]	Persons admitted for depressive or suicidal illnesses to 9 psychiatric inpatient facilities in San Francisco, CA, who continued with therapy for ≥ 30 days post-discharge	Mean age, 34.4	Intervention: Brief contact using letters sent over varying time periods for 5 yrs Control: No further contact
Outpatient Day Hospitalization vs Usual Care			
Rudd et al, 1996[33]	Patients referred from 2 mental health clinics, 1 emergency department, and 1 inpatient psychiatric unit who had a suicide attempt, mood disorder and suicide ideation, or substance abuse and suicide ideation without psychosis or personality disorder	Mean age, 22 (SD = 2.3 yrs)	Intervention: Outpatient intensive structured group treatment by mental health professionals for 2 wks Control: Standard aftercare

* Not in Hawton et al review.[18]

† Inclusion criteria required diagnosis of borderline personality disorder; all others required DSH.

‡ Primary care treatment setting; all other studies conducted in specialty care settings.

CI, confidence interval; DSH, deliberate self-harm; NA, not available; NR, not reported; OR, odds ratio; SD, standard deviation.

Table 2. Additional Randomized Controlled Trials of Interventions to Reduce Deliberate Self-Harm in Adults and Older Adolescents* (cont)

Follow-up Period (After Enrollment)	Number (%) of Participants with DSH during Follow-up	Odds Ratio (95% CI) or Reported Statistics
6 mos	Intervention: 5/58 (8.6) Control: 17/61 (27.9)	No OR given; between-group difference, 19.3 (8.6–30.0); $P < 0.001$
36 mos	Intervention: 4/22 (18.2) Control: 2/19 (63.2)	No OR given; $P < 0.004$ (Fisher exact test)
6 mos	Intervention: 70/417 (16.8) Control: 59/410 (14.4)	Overall OR: 1.20 (0.82–1.75) OR for prior DSH: 1.85 (1.14–3.03) OR for no prior DSH: 0.64 (0.34–1.22)
≤ 15 yrs	Intervention: 15/389 (3.9) Control: 21/454 (4.6)	OR not reported; patients with suicide as cause of death 5 yrs post-intervention Intervention: 3.9% Control: 4.6%
1 yr	Several measures of suicidal ideation and behavior (including Modified Scale for Suicidal Ideation and the Suicide Probability Scale) analyzed; no difference between intervention and control groups	

continue

Table 2. Additional Randomized Controlled Trials of Interventions to Reduce Deliberate Self-Harm in Adults and Older Adolescents* (cont)

Study, Year	Population	Age Range (Yrs)	Intervention and Control Groups
Fluoxetine (Antidepressant) vs Placebo			
Montgomery et al, 1994[61]	Patients without current major depression with a history of ≥ 2 suicide attempts, identified from a psychiatric clinic	NR	Intervention: Fluoxetine twice a wk in psychiatric clinic for 6 mos Control: Placebo twice a wk for 6 mos
Fluphenazine (Antipsychotic) vs Placebo			
Battaglia et al, 1999[63]	Non-psychotic patients with a suicide attempt in the previous 30 days who had ≥ 2 prior suicide attempts recruited from a psychiatric emergency department	18–65	Intervention: Low-dose intramuscular injection monthly for 6 mos Control: Ultra-low-dose intramuscular injection monthly for 6 mos
Dialectical Behavioral Therapy vs Usual Care			
Koons et al, 2001[34]†	Women veterans with borderline personality disorder without schizophrenia, bipolar disorder, substance abuse, or antisocial personality disorder	21–46	Intervention: Dialectical behavioral therapy by mental health professional for 6 mos Control: Enhanced standard aftercare
Follow-up Letter and General Guidelines vs Standard Care			
Bennewith et al, 2002[35]‡ Subgroup analysis dichotomized by prior history of DSH	Patients without substance abuse or DSH secondary to psychosis with a new episode of DSH; identified from a DSH case register based on weekly reports from local hospitals' accident and emergency departments	16–95	Intervention: One-time education and consultation letter on DSH management provided to primary care physicians whose patients had recent DSH episode Control: Standard aftercare

Table 2. Additional Randomized Controlled Trials of Interventions to Reduce Deliberate Self-Harm in Adults and Older Adolescents* (cont)

Follow-up Period (After Enrollment)	Number (%) of Participants with DSH during Follow-up	Odds Ratio (95% CI) or Reported Statistics
6 mos	Intervention: 18/54 (33.3) Control: 18/53 (34.0)	NA
6 mos	Intervention: Change of –0.16 in rate of serious self-harm behaviors per mo over 6 mos Control: Change of –0.06 rate of serious self-harm behaviors per mo over 6 mos	$P = 0.146$ (Mann-Whitney test)
6 mos	Intervention: 1/10 (10) Control: 2/10 (20)	NA
12 mos	Intervention: 211/964 (21.9) Control: 189/968 (19.5)	Overall OR: 1.17 (0.94–1.47) Prior DSH OR: 0.57 (0.33–0.98) No prior DSH OR: 1.32 (1.02–1.70)

In the only study that tested an intervention for suicide risk in the primary care setting, Bennewith et al compared a 3-part, 1-time intervention with usual care.[35] The intervention provided general practitioners with: (1) a letter informing them of a patient's deliberate self-harm episode; (2) a letter the physicians could forward to the patient inviting him or her to make an appointment; and (3) guidelines on assessing and managing deliberate self-harm in general practice. In an intention-to-treat analysis at a 12-month follow-up, the groups did not differ significantly in the proportion of patients who attempted suicide (21.9% vs 19.5%). Adherence to this low-intensity intervention was poor; only 58% of the intervention-group physicians sent letters to the patients.

Of note, the investigators reported a subgroup analysis with results opposite to those of Evans et al.[62] For patients with prior deliberate self-harm, this primary care intervention significantly decreased the likelihood of repeat deliberate self-harm, whereas for those with no prior deliberate self-harm, the intervention increased the likelihood of repetition (Table 2). The variability of adherence in the Bennewith et al study and the differences in the 2 trials' study populations may partially explain the contradictory results.

Cohort Studies

Two cohort studies, each using depression as part of how they selected participants, met our inclusion criteria.[64,65] Neither study produced statistically significant differences involving repeated suicidal behavior (Table 3).

Using a nested case-control design, Coryell et al evaluated suicide risk in a long-term cohort of patients with major affective disorders.[64] In this small study, case-patients were compared with

Table 3. Cohort Studies to Decrease Suicidal Behavior in At-risk Patients

Study, Year	Study Type	Population	Age Range (Yrs)
Lithium Use in Week Preceding Suicide or Suicide Attempt vs No Lithium Use			
Coryell et al, 2001[64]	Nested case-control	Patients treated for major affective disorders identified from 5 academic medical centers; 2 case groups: suicide completers and suicide attempters; controls were matched with cases on sex, polarity at intake, history of substance abuse, and extent of treatment	≥ 17
Cognitive Behavioral Counseling vs Usual Care			
Raj et al, 2001[65]	Cohort	Patients who attempted suicide for the first or second time by overdosing on drugs or pesticides who also had anxiety or depression; patients were excluded if they had psychosis, dysthymia, bipolar affective disorder, substance abuse, eating disorder, or personality disorder	16–50

DSH, deliberate self-harm; NA, not available.

controls for use of lithium in the week before the suicide completion (15 case-patients vs 15 matched controls) or suicide attempt (41 case-patients vs 41 matched controls); all were receiving some type of treatment at the time of the episode. The investigators found no relationship between lithium use and suicide or suicide attempts.

Raj et al compared the use of 10 weekly sessions of cognitive-behavioral counseling with routine medical treatment for patients admitted to the intensive care unit (ICU) of a general hospital following their first or second suicide attempt.[65] Upon ICU admission, the 40 enrolled patients were sequentially assigned to either the counseling intervention or routine medical care with the option to attend therapy sessions. None of the intervention group repeated a suicide attempt at 2 to 3 months of follow-up; 1 patient in the control group made a repeated suicide attempt.

Does Treatment Result in Improved Intermediate Outcomes?

We identified 1 systematic review[26] and 4 additional articles that studied intermediate outcomes in patients at high risk for suicide.[34,60,65,66] Again, study heterogeneity (interventions tested, treatment duration, follow-up length, and outcomes used) precluded integration of the new studies into the prior review.

Prior Review of RCTs Involving Intermediate Outcomes

Townsend et al conducted a systematic review of 6 RCTs[37–41,67] involving brief problem-solving therapy in patients with deliberate self-harm, in which the outcomes included depressive severity, hopelessness, and improvement in problems (Table 4).[26] Treatment duration and length of

Table 3. Cohort Studies to Decrease Suicidal Behavior in At-risk Patients (cont)

Study Design	Follow-up (After Enrollment)	Number (%) of Participants with DSH during Follow-up	Reported Statistic
Two case groups (suicide completers and attempters) and 2 matched control groups to evaluate medication use at time of suicidal behavior	Unclear period of time (≥ 14 yrs)	Lithium use: Completers: 40.0% Controls of completers: 53.3% Attempters: 22.0% Controls of attempters: 19.5%	McNemar chi square: 0.667 McNemar chi square: 0.067
Sequential allocation to treatment; intervention: 10 sessions of cognitive behavioral therapy with mental health professional plus outreach for 3 mos	2–3 mos	Intervention: 0/20 (0)	NA
Control: standard aftercare		Control: 1/20 (5)	

Table 4. Prior Review of Randomized Controlled Trials Comparing Problem-solving Therapy vs Standard Aftercare for Intermediate Outcomes*

Study, Year	Intervention and Treatment Duration	Follow-up (After Enrollment)	Depression: Standardized Mean Difference (95% CI)	Hopelessness: Weighted Mean Difference (95% CI)	OR for Improvement in Problems (95% CI)
Gibbons et al, 1978[37]	Mean number of 9 sessions over 12 wks	4 mos	–0.18 (–0.52 to 0.15)	NR	2.74 (1.40 to 5.36)
Hawton et al, 1987[38]	≤ 8 sessions over 8 wks	9 mos	–0.31 (–0.80 to 0.18)	NR	1.38 (0.43 to 4.47)
Salkovskis et al, 1990[39]	5 sessions over 4 wks	12 mos	–1.24 (–2.24 to -0.25)	–3.25 (–5.31 to –1.19)	NR
McLeavey et al, 1994[40]	5 sessions over 5 wks	7–8 mos	NR	0.50 (–4.51 to 5.5)	NR
Evans et al, 1999[41]	2–6 sessions over unclear period	6 mos	–0.86 (–1.60 to –0.13)	NR	NR
Patsiokas and Clum, 1985[67]	10 sessions over 3 wks	About 1 mo	NR	–6.60 (–13.73 to 0.53)	NR
Meta-analytic summary statistic			–0.36 (–0.61 to –0.11)	–2.97 (–4.81 to –1.13)	2.31 (1.29 to 4.13)

* Data are from Townsend et al, 2001.[26] Population and age range already described for each study in Table 1 except for Patsiokas and Clum, for which the study was conducted in "adult" deliberate self-harm patients recruited from a U.S. inpatient psychiatric ward.

CI, confidence interval; NR, not reported; OR, odds ratio.

follow-up varied substantially across studies, and the analyses were not stratified according to age. The 4 studies that evaluated depressive outcomes[37–39,41] used 2 different scales for depression, requiring the authors to calculate a standardized mean difference (SMD; the mean difference divided by the pooled sample standard deviation) to evaluate depressive symptoms. The summary SMD indicated a significantly lower depression score of about one-third of a standard deviation for patients offered problem-solving therapy compared with those receiving usual care (–0.36; 95% CI, –0.61 to –0.11). Three trials measured hopelessness, which is strongly correlated with suicidal ideation[39,40,67] using the Beck Hopelessness Scale.[68] The authors calculated a weighted mean difference with those receiving problem-solving therapy averaging approximately 3 points less on hopelessness scores at follow-up than did those receiving standard care (–2.97 points; 95% CI, –4.81 to –1.13). Two trials measured whether problems had improved (a dichotomous measure rated by assessors blinded to treatment).[37,38] Improvement in problems was more likely in those receiving problem-solving therapy compared with those receiving usual care (OR, 2.31; 95% CI, 1.29–4.13) (Table 4).

Additional RCTs Involving Intermediate Outcomes

As shown in Table 5, Guthrie et al measured suicidal ideation in an RCT comparing interpersonal psychotherapy with usual care.[60] Suicidal ideation, as measured by the Scale for Suicidal Ideation (SSI)[69] at 6-month follow-up, was significantly lower for the psychotherapy group (mean difference, –4.9; 95% CI, –8.2 to –1.6;

Table 5. Additional Studies Involving Intermediate Outcomes

Study, Year	Study Type	Intervention and Treatment Duration	Follow-up (After Enrollment)	Age Range (Yrs)	Outcome	Intervention Group	Control Group	Reported Statistic
Interpersonal Psychotherapy vs Standard Aftercare								
Guthrie et al, 2001[60]	RCT	4 sessions over 1 mo	6 mos	18–65	Scale for SI score (69)	7.9	12.8	Mean difference, –4.9 (95% CI, –8.2 to –1.6, $P <$ 0.0005)
Dialectical Behavioral Therapy vs Usual Care								
Koons et al, 2001[34]	RCT	Weekly sessions over 6 mos	6 mos	21–46	Scale for SI (69)	10-point decrease	4-point decrease	$P < 0.05$ by 2-way repeated-measures analysis of variance
					Depressive severity	BDI: 9.4-point decrease	BDI: 5.4-point decrease	$P < 0.05$ by 2-way repeated-measures analysis of variance
						HAM-D: 12.6-point decrease	HAM-D: 8.3-point decrease	NS
Mianserin (Mi) vs Amitryptyline (Am) vs Maprotiline (Ma) (All Antidepressants)								
Montgomery et al, 1978[66]	Cohort	1 mo	1 mo	NR	Suicidal thoughts	By HAM-D: Mi: NA Am: NA Ma: NA	NR	No difference among 3 drugs
						By MADRS: Mi: ~11 Am: ~ 5 Ma: ~ 6	NR	Greater SI decrease only with Mi vs Ma ($P < 0.01$)
Cognitive-Behavioral Counseling vs Usual Care								
Raj et al, 2001[65]	Cohort	2–3 mos	3 mos	16–50	Scale for SI	15-point mean decrease	2.75-point mean decrease	$P < 0.00$

BDI, Beck Depression Inventory (self-report); CI, confidence interval; HAM-D, Hamilton Depressive Rating Scale; MADRS, Montgomery–Asberg Depression Rating Scale; NA, not available; NR, not reported; NS, not significant; RCT, randomized controlled trial; SI, suicidal ideation.

$P < 0.001$). A priori, the authors had identified a difference of 5 points as being clinically significant.

Koons et al measured suicidal ideation and depressive severity in their 6-month RCT of women veterans with borderline personality disorder.[34] For those completing treatment, DBT was superior to usual care in decreasing suicidal ideation as measured by the SSI[69] (10-point decrease vs 4-point decrease; $P < 0.05$). As measured by the self-report Beck Depression Inventory,[70] DBT produced a significantly greater decrease in depressive symptoms than usual care (2-way analysis of variance, $P < 0.05$), which is inconsistent with the authors' findings using the Hamilton Depressive Rating Scale (HAM-D),[71] which showed no significantly greater decrease for DBT versus usual care.

Montgomery et al performed a 4-week cohort study comparing the antidepressants mianserin, amitriptyline, and maprotiline.[66] Suicidal ideation, as measured by the Montgomery–Asberg Depression Rating Scale, was decreased by a significantly greater degree by mianserin compared with maprotiline ($P < 0.01$); a trend favoring mianserin over amitriptyline was also observed ($P < 0.10$). The 3 study drugs showed no differences for the analogous "suicidal thoughts" on the HAM-D, and the overall quality of the study was poor.

Raj et al also measured the effect of a cognitive-behavioral intervention on suicide ideation.[65] Assessing the difference in SSI scores between baseline and 2 to 3 months post-discharge for the 2 groups, they found that those who received counseling had a substantially greater reduction in suicidal ideation than the usual care group (mean decrease 15 vs 2.75; $P < 0.001$).

Discussion

Evidence for or against the value of screening for suicide risk in primary care settings must be considered within a complex practice and epidemiological context. Suicide is a rare outcome, even among high-risk groups; this fact alone creates methodological challenges. RCTs, the gold standard for showing efficacy in evidence reviews, ethically cannot include a true placebo arm; consequently, all interventions are being compared with treatment arms that in fact may or may not be effective. Finally, patterns of suicide behaviors are very complex. Although a prior suicide attempt is a strong risk factor for completed suicide, sociodemographic characteristics and behaviors clearly differ across groups of those who attempt suicide, practice repetitive deliberate self-harm, and successfully complete suicide. To focus exclusively on completed suicide reveals dramatic differences in rates and methods across the life span, between males and females, and between different race and ethnicity groups. Current research, in large part, does not address this complexity.

Within this context, we have reviewed literature published since 1966 with the goal of better defining the clinician's role in screening for suicide risk in primary care settings. Despite the public health import of suicide and the Surgeon General's call to action, evidence to guide the primary care clinician's assessment and management of suicide risk is extremely limited. No studies address the overarching question of whether screening for suicide risk in primary care patients improves outcome. Consequently, we must approach this issue by analyzing studies examining the intervening linkage questions.

Very little is known about use of screening instruments for suicide risk in primary care populations. One prospective study identified reasonable test characteristics for persons reporting that they were "feeling suicidal" compared with responses indicating the presence of a plan. This study has not been replicated, nor has the specific question identified ("feeling suicidal") been tested independently of the longer instrument.

Regarding whether interventions for those at risk reduce suicide attempts or completions, the poor generalizability of the studies makes the overall strength of evidence fair, at best, while the results are mixed.[25] Although some trends suggest incremental benefit from several interventions, no consistent statistically significant effects have emerged for interventions for which more than 1 study has been done. Of the interventions for which only 1 study has been done, promising interventions included DBT for borderline personality disorder[49] and interpersonal psychotherapy for deliberate

self-harm.[60] These interventions, however, require further confirmation.

We should emphasize that our review did not include all of the available clinical trial literature involving suicide attempts or completions. Some literature has examined the effectiveness of medications, such as lithium, in the prevention of suicide among psychiatric patients with major mood disorders, as reflected in a recent meta-analysis by Tondo et al.[72] We excluded these studies because they did not meet our inclusion criteria of controlled trials with adequate comparison groups.

Several studies showed improvement for intermediate outcomes, primarily for persons at high risk for deliberate self-harm. Specifically, meta-analyses of RCTs using problem-solving therapy have shown benefit, as indicated by improved mood, decreased hopelessness, and improvement in problems.[26] In addition, 1 RCT involving interpersonal psychotherapy[60] and 1 RCT involving DBT[34] documented decreased suicidal ideation; finally, 1 cohort study of cognitive-behavioral therapy showed decreased suicidal ideation.[65]

Priorities for a Research Agenda

Our review highlights several important issues involving research on assessing and managing suicide risk. First, the challenge of studying interventions for a rare event is underscored by the fact that, even in a population with a relatively high risk for deliberate self-harm, documenting incremental benefit relative to standard care has been difficult. This difficulty is attributable at least in part to the fact that most studies are under-powered to detect significant differences, thereby increasing the risk for falsely concluding that an effective intervention does not produce a statistically significant benefit, whereas studies that have larger sample sizes typically provide the least intense (and, arguably, likely less efficacious) interventions.[35] Future research must consider the feasibility of large, multi-site studies that have sufficient power to identify the benefit of interventions for a substantial health problem that is a relatively rare event.

Second, the generalizability of the available evidence to a primary care population with unidentified suicide risk is poor. The great majority of research has been conducted in psychiatric populations with an already identified risk for suicide rather than among unidentified patients in primary care, who as a group are at lower risk. The existing literature includes only 1 screening study conducted in a primary care setting.[10] Only 1 intervention study involved patients recruited from primary care practices,[34] and all the intervention studies involved patients identified as being at high risk for harming themselves (and, consequently, are likely to be in treatment with a mental health professional). Only 1 study conducted the intervention in a primary care setting.[35] High priorities for future research include examining the test characteristics of instruments used to determine suicide risk in primary care settings, recruiting patients for intervention studies from primary care settings, and testing interventions in primary care settings.

Third, the available studies focused on those with relatively moderate risk for suicide and, for ethical and clinical reasons, excluded patients at the highest risk. Most identified high-risk patients are likely admitted to a psychiatric unit for safety, which may or may not in itself be an effective intervention. Subsequent research should consider how to stratify at-risk primary care patients and target interventions to risk severity.

Fourth, the lack of evidence for incremental benefit from a particular intervention compared with standard care is not equivalent to saying that nothing works. Standard care in many instances may be a successful intervention; it may be "good enough." However, the components of standard care are poorly described in the existing literature and probably vary across studies, making the comparison to the experimental intervention difficult to evaluate. Subsequent research could address this shortcoming by more carefully monitoring and defining standard care.

Fifth, making meaningful conclusions specific to any particular age group is difficult. Available studies were not stratified by age; as a result, drawing conclusions specific to young adults or

elderly adults is a challenge. In addition, despite the concern about increased risk for suicide in the elderly, there is a dearth of information to guide evidence-based assessment and management strategies in primary care. Results from the PROSPECT trial will begin to fill this void.[36] Subsequent research should involve populations with more clearly defined age groups and analyses stratified by age to allow more meaningful interpretation for specific high-risk age groups.

Sixth, dramatic differences in suicide behaviors among men and women and among different racial and ethnic groups have drawn little attention. A better understanding of these variations may have direct implications for screening and treatment strategies, and they warrant further research.

Seventh, our review is relevant only to those individuals who access clinical care, which means that a large portion of the population may be ignored. Community-based research can presumably address this question.

Finally, we did not find studies meeting our inclusion criteria that addressed whether more adequate treatment of depressed patients or substance-abusing patients will decrease the risk for suicide. We think such a clinically guided approach is key for the primary care physician to balance effectively the public health import of suicide with the real challenge of improving the outcome of a rare event. Approximately 90% of patients who completed suicide have a diagnosable psychiatric illness, with the great preponderance having depression or substance abuse. A more feasible means of decreasing suicide may be to focus on the high-risk groups, such as depressed primary care patients for whom routine screening is already recommended,[73] and to focus efforts to decrease risk toward improving the adequate management of depression.[74] Improving depression management may both improve depressive outcomes and decrease suicide risk. This strategy is reasonable and practical from a clinical perspective and testable from a research perspective. It is also necessary. Assessing suicidal ideation is the standard of care in the evaluation for depression, and routine depression screening will likely identify more patients with suicidal ideation, for which primary care clinicians will need evidence-based management strategies. Retrospective analyses have suggested that educating general practitioners on better identification and treatment of depression may be an effective method of suicide prevention.[75] Subsequent prospective clinical trials focusing on primary care are needed to develop this evidence base.

Acknowledgments

We acknowledge the continuing support of David Atkins, MD, MPH, who is the Chief Medical Officer for AHRQ's Center for Practice and Technology Assessment; and Jean Slutsky, PA, MSPH, AHRQ Task Order Officer for the USPSTF project. We appreciate the considerable support and contributions of members of the RTI International staff: Sonya Sutton, BSPH, and Loraine Monroe. In addition, we thank the staff from the University of North Carolina at Chapel Hill and the Cecil G. Sheps Center for Health Services Research: Carol Krasnov for administrative assistance and coordination and Timothy S. Carey, MD, MPH, Director of the Sheps Center and Co-director of the RTI International—University of North Carolina Evidence-based Practice Center.

References

1. National Center for Injury Prevention and Control. WISQARS (Web-based Injury Statistics Query and Reporting System). Available at: http://www.cdc.gov/ncipc/wisqars/. Accessed December 2, 2003.

2. National Institute of Mental Health. Suicide facts. Available at: http://www.nimh.nih.gov/research/suifact.cfm. Accessed December 2, 2003.

3. Office of the Surgeon General. The Surgeon General's Call to Action to Prevent Suicide. Washington, DC: Department of Health and Human Services, U.S. Public Health Service; 1999.

4. Druss B, Pincus H. Suicidal ideation and suicide attempts in general medical illnesses. *Arch Intern Med*. 2000;160:1522–1526.

5. National Strategy for Suicide Prevention: Goals and Objectives for Action. Rockville, MD: U.S.

Department of Health and Human Services, Public Health Service; 2001.

6. Schmidtke A, Bille-Brahe U, DeLeo D, et al. Attempted suicide in Europe: rates, trends and sociodemographic characteristics of suicide attempters during the period 1989–1992. Results of the WHO/EURO Multicentre Study on Parasuicide. *Acta Psychiatr Scand*. 1996;93:327–338.

7. Hirschfeld RM, Russell JM. Assessment and treatment of suicidal patients. *N Engl J Med*. 1997;337:910–915.

8. Brown GK, Beck AT, Steer RA, Grisham JR. Risk factors for suicide in psychiatric outpatients: a 20-year prospective study. *J Consult Clin Psychol*. 2000;68:371–377.

9. Mann JJ. A current perspective of suicide and attempted suicide. *Ann Intern Med*. 2002;136:302–311.

10. Olfson M, Weissman MM, Leon AC, Sheehan DV, Farber L. Suicidal ideation in primary care. *J Gen Intern Med*. 1996;11:447–453.

11. Zimmerman M, Lish JD, Lush DT, Farber NJ, Plescia G, Kuzma MA. Suicidal ideation among urban medical outpatients. *J Gen Intern Med*. 1995;10:573–576.

12. Blumenthal SJ. Suicide: a guide to risk factors, assessment, and treatment of suicidal patients. *Med Clin North Am*. 1988;72:937–971.

13. Pirkis J, Burgess P. Suicide and recency of health care contacts. A systematic review. *Br J Psychiatry*. 1998;173:462–474.

14. Luoma JB, Martin CE, Pearson JL. Contact with mental health and primary care providers before suicide: a review of the evidence. *Am J Psychiatry*. 2002;159:909–916.

15. Robins E, Murphy GE, Wilkinson RH Jr, Gassner S, Kayes J. Some clinical considerations in the prevention of suicide based on a study of 134 successful suicides. *Am J Pub Health*. 1959;49:888–899.

16. Zametkin AJ, Alter MR, Yemini T. Suicide in teenagers: assessment, management, and prevention. *JAMA*. 2001;286:3120–3125.

17. Murphy SL. Deaths: final data for 1998. *Natl Vital Stat Rep*. 2000;48:1–105.

18. Hawton K, Townsend E, Arensman E, et al. Psychosocial versus pharmacological treatments for deliberate self harm. *Cochrane Database Syst Rev.* 2000:CD001764.

19. Hawton K, Harriss L, Simkin S, Bale E, Bond A. Deliberate Self-Harm in Oxford 1999. Annual Report from Centre for Suicide Research. Oxford: Univ of Oxford; 2000.

20. Gilbody S, House A, Owens D. The early repetition of deliberate self harm. *J R Coll Physicians Lond*. 1997;31:171–172.

21. Gunnell D, Frankel S. Prevention of suicide: aspirations and evidence. *BMJ*. 1994;308:1227–1233.

22. Crockett AW. Patterns of consultation and parasuicide. *Br Med J (Clin Res Ed)*. 1987;295:476–478.

23. Sansone RA, Wiederman MW, Sansone LA, Monteith D. Patterns of self-harm behavior among women with borderline personality symptomatology: psychiatric versus primary care samples. *Gen Hosp Psychiatry*. 2000;22:174–178.

24. U.S. Preventive Services Task Force. Screening for Suicide Risk. *Guide to Clinical Preventive Services*. 2nd ed. Washington, DC: Office of Disease Prevention and Health Promotion; 1996:547–554.

25. Harris RP, Helfand M, Woolf SH, et al. Current methods of the U.S. Preventive Services Task Force: a review of the process. *Am J Prev Med*. 2001;20:21–35.

26. Townsend E, Hawton K, Altman DG, et al. The efficacy of problem-solving treatments after deliberate self-harm: meta-analysis of randomized controlled trials with respect to depression, hopelessness and improvement in problems. *Psychol Med*. 2001;31:979–988.

27. Gaynes BN, West SL, Ford C, Frame P, Klein J, Lohr KN. *Screening for Suicide Risk*. Systematic Evidence Review No. 32 (Prepared by the Research Triangle Institute—University of North Carolina Evidence-based Practice Center under Contract No. 290–97–0011). Rockville, MD: Agency for Healthcare Research and Quality. May 2004. (Available on the AHRQ Web site at: www.ahrq.gov/clinic/serfiles.htm).

28. Broadhead WE, Leon AC, Weissman MM, et al. Development and validation of the SDDS-PC screen for multiple mental disorders in primary care. *Arch Fam Med*. 1995;4:211–219.

29. Spitzer RL, Williams JB, Gibbon M, First MB. The Structured Clinical Interview for DSM-III-R (SCID). I: History, rationale, and description. *Arch Gen Psychiatry*. 1992;49:624–629.

30. Pignone M, Gaynes B, Rushton JL, et al. *Screening for Depression*. Systematic Evidence Review No 6 (Prepared by the Research Triangle Institute—University of North Carolina Evidence-based Practice Center under Contract No. 290-97-0011). Rockville, MD: Agency for Healthcare Research and Quality, AHRQ Publication No. 02-S002; 2001. (Available on the AHRQ Web site at: www.ahrq.gov/clinic/serfiles.htm).

31. Williams JW Jr, Pignone M, Ramirez G, Perez Stellato C. Identifying depression in primary care: a literature synthesis of case-finding instruments. *Gen Hosp Psychiatry*. 2002;24:225–237.

32. Motto JA, Bostrom AG. A randomized controlled trial of postcrisis suicide prevention. *Psychiatr Serv*. 2001;52:828–833.

33. Rudd MD, Rajab MH, Orman DT, Joiner T, Stulman DA, Dixon W. Effectiveness of an outpatient intervention targeting suicidal young adults: preliminary results. *J Consult Clin Psychol*. 1996;64:179–190.

34. Koons CR, Robins CJ, Tweed JL, Lynch TR. Efficacy of dialectical behavior therapy in women veterans with borderline personality disorder. *Behavior Therapy*. 2001;32:371–390.

35. Bennewith O, Stocks N, Gunnell D, Peters TJ, Evans MO, Sharp DJ. General practice based intervention to prevent repeat episodes of deliberate self harm: cluster randomised controlled trial. *BMJ*. 2002;324:1254–1257.

36. Bruce ML, Pearson JL. Designing an intervention to prevent suicide: PROSPECT (Prevention of Suicide in Primary Care Elderly: Collaborative Trial.) Dialogues in *Clin Neuroscience*. 1999;1:100–112.

37. Gibbons JS, Butler J, Urwin P, Gibbons JL. Evaluation of a social work service for self-poisoning patients. *Br J Psychiatry*. 1978;133:111–118.

38. Hawton K, McKeown S, Day A, Martin P, O'Connor M, Yule J. Evaluation of out-patient counselling compared with general practitioner care following overdoses. *Psychol Med*. 1987;17:751–761.

39. Salkovskis PM, Atha C, Storer D. Cognitive-behavioural problem solving in the treatment of patients who repeatedly attempt suicide. A controlled trial. *Br J Psychiatry*. 1990;157:871–876.

40. McLeavey BC, Daly RS, Ludgate JW, Murray CM. Interpersonal problem-solving skills training in the treatment of self-poisoning patients. *Suicide Life Threat Behav*. 1994;24:382–394.

41. Evans K, Tyrer P, Catalan J, et al. Manual-assisted cognitive-behaviour therapy (MACT): a randomized controlled trial of a brief intervention with bibliotherapy in the treatment of recurrent deliberate self-harm. *Psychol Med*. 1999;29:19–25.

42. Chowdhury N, Hicks RC, Kreitman N. Evaluation of an after-care service for parasuicide (attempted suicide) patients. *Soc Psychiatry*. 1973;8:67–81.

43. Welu TC. A follow-up program for suicide attempters: evaluation of effectiveness. *Suicide Life Threat Behav*. 1977;7:17–20.

44. Hawton K, Bancroft J, Catalan J, Kingston B, Stedeford A, Welch N. Domiciliary and out-patient treatment of self-poisoning patients by medical and non-medical staff. *Psychol Med*. 1981;11:169–177.

45. Allard R, Marshall M, Plante MC. Intensive follow-up does not decrease the risk of repeat suicide attempts. *Suicide Life Threat Behav*. 1992;22:303–314.

46. Van Heeringen C, Jannes S, Buylaert W, Henderick H, De Bacquer D, Van Remoortel J. The management of non-compliance with referral to out-patient after-care among attempted suicide patients: a controlled intervention study. *Psychol Med*. 1995;25:963–970.

47. van der Sande R, van Rooijen L, Buskens E, et al. Intensive in-patient and community intervention versus routine care after attempted suicide. A randomised controlled intervention study. *Br J Psychiatry*. 1997;171:35–41.

48. Morgan HG, Jones EM, Owen JH. Secondary prevention of non-fatal deliberate self-harm.

The green card study. *Br J Psychiatry*. 1993;163:111–112.

49. Linehan MM, Armstrong HE, Suarez A, Allmon D, Heard HL. Cognitive-behavioral treatment of chronically parasuicidal borderline patients. *Arch Gen Psychiatry*. 1991;48:1060–1064.

50. Liberman RP, Eckman T. Behavior therapy vs insight-oriented therapy for repeated suicide attempters. *Arch Gen Psychiatry*. 1981;38:1126–1130.

51. Torhorst A, Moller HJ, Burk F, Kurz A, Wachtler C, Lauter H. The psychiatric management of parasuicide patients: a controlled clinical study comparing different strategies of outpatient treatment. *Crisis*. 1987;8:53–61.

52. Waterhouse J, Platt S. General hospital admission in the management of parasuicide. A randomised controlled trial. *Br J Psychiatry*. 1990;156:236–242.

53. Montgomery SA, Montgomery DB, Jayanthi-Rani S. Maintenance therapy in repeat suicidal behaviour: a placebo controlled trial [Abstract]. Proceedings of the 10th International Congress for Suicide Prevention and Crisis Intervention. Ottawa, Canada. 1979:227–229.

54. Hirsch SR, Walsh C, Draper R. Parasuicide. A review of treatment interventions. *J Affect Disord*. 1982;4:299–311.

55. Montgomery SA, Roy D, Montgomery DB. The prevention of recurrent suicidal acts. *Br J Clin Pharmacol*. 1983;15 Suppl 2:183S–188S.

56. Verkes RJ, Van der Mast RC, Hengeveld MW, Tuyl JP, Zwinderman AH, Van Kempen GM. Reduction by paroxetine of suicidal behavior in patients with repeated suicide attempts but not major depression. *Am J Psychiatry*. 1998;155:543–547.

57. Torhorst A, Moller HJ, Schmid-Bode KW. Comparing a 3-month and a 12-month-outpatient aftecare program for parasuicide repeaters. In: Moller HJ, Schmidtke A, Welz R, eds. Current Issues of *Suicidology*. Berlin, Germany: Springer-Verlag; 1988:19–24.

58. Bateman A, Fonagy P. Effectiveness of partial hospitalization in the treatment of borderline personality disorder: a randomized controlled trial. *Am J Psychiatry*. 1999;156:1563–1569.

59. Bateman A, Fonagy P. Treatment of borderline personality disorder with psychoanalytically oriented partial hospitalization: an 18-month follow-up. *Am J Psychiatry*. 2001;158:36–42.

60. Guthrie E, Kapur N, Mackway-Jones K, et al. Randomised controlled trial of brief psychological intervention after deliberate self poisoning. *BMJ*. 2001;323:135–138.

61. Montgomery DB, Roberts A, Green M, Bullock T, Baldwin D, Montgomery SA . Lack of efficacy of fluoxetine in recurrent brief depression and suicidal attempts. *Eur Arch Psychiatry Clin Neurosci*. 1994;244:211–215.

62. Evans MO, Morgan HG, Hayward A, Gunnell DJ. Crisis telephone consultation for deliberate self-harm patients: effects on repetition. *Br J Psychiatry*. 1999;175:23–27.

63. Battaglia J, Wolff TK, Wagner-Johnson DS, Rush AJ, Carmody TJ, Basco MR. Structured diagnostic assessment and depot fluphenazine treatment of multiple suicide attempters in the emergency department. *Int Clin Psychopharmacol*. 1999;14:361–372.

64. Coryell W, Arndt S, Turvey C, et al. Lithium and suicidal behavior in major affective disorder: a case-control study. *Acta Psychiatr Scand*. 2001;104:193–197.

65. Raj M AJ, Kumaraiah V, Bhide AV. Cognitive-behavioural intervention in deliberate self-harm. *Acta Psychiatr Scand*. 2001;104:340–345.

66. Montgomery S, Cronholm B, Asberg M, Montgomery DB. Differential effects on suicidal ideation of mianserin, maprotiline and amitriptyline. *Br J Clin Pharmacol*. 1978;5 Suppl 1:77S–80S.

67. Patsiokas AT, Clum GA. Effects of psychotherapeutic strategies in the treatment of suicide attempters. *J Psychother*. 1985;22:281.

68. Beck AT, Schuyler D, Herman I. Development of suicidal intent scales. In: Beck AT, Resnick HLP, Lettieri DJ, eds. The Prediction of Suicide. Philadelphia: Charles Press; 1974:45–56.

69. Beck AT, Kovacs M, Weissman A. Assessment of suicidal intention: the Scale for Suicide Ideation. *J Consult Clin Psychol*. 1979;47:343–352.

70. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. *Arch Gen Psychiatry*. 1961;41:561–571.

71. Hamilton M. A rating scale for depression. *J Neurol Neurosurg Psychiatry*. 1960;23:56–62.

72. Tondo L, Hennen J, Baldessarini RJ. Lower suicide risk with long-term lithium treatment in major affective illness: a meta-analysis. *Acta Psychiatr Scand*. 2001;104:163–172.

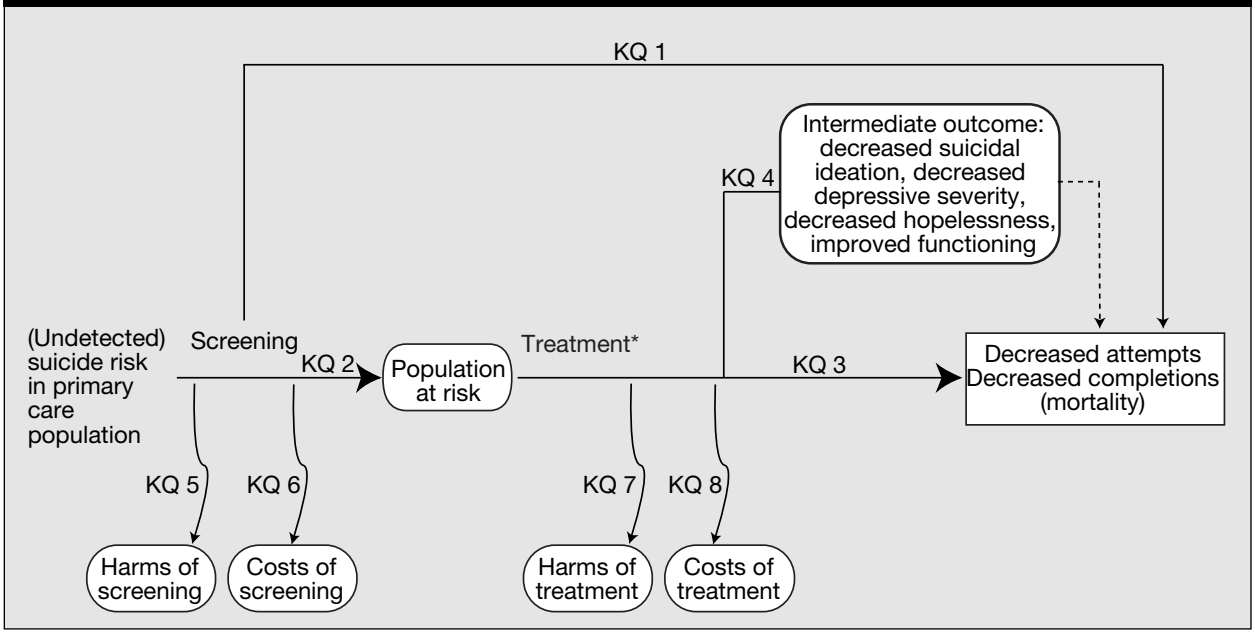
73. Pignone MP, Gaynes BN, Rushton JL, et al. Screening for depression in adults: a summary of the evidence for the U.S. Preventive Services Task Force. *Ann Intern Med*. 2002;136:765–776.

74. Kessler RC, Berglund P, Demler O, et al. The epidemiology of major depressive disorder: results from the National Comorbidity Survey Replication (NCS-R). *JAMA*. 2003;289:3095–3105.

75. Rihmer Z, Rutz W, Pihlgren H. Depression and suicide on Gotland. An intensive study of all suicides before and after a depression-training programme for general practitioners. *J Affect Disord*. 1995;35:147–152.

Appendix

Appendix Figure 1. Screening for Suicide Risk: Analytic Framework



* Treatments were categorized by intervention type after the literature search.

Appendix Table 1. Key Questions for Screening for Suicide Risk

Number	Question
1	Does screening for suicide risk in primary care settings result in decreased attempts and/or decreased mortality?
2	Can a screening test reliably detect suicide risk in primary care populations?
3	Main outcome: For those identified as being at risk, does treatment result in decreased suicide attempts and/or decreased mortality from suicide?
4	Intermediate outcome: For those identified as being at risk, does treatment result in decreased suicidal ideation, decreased depressive severity, decreased hopelessness, or improved level of functioning?
5	What are the harms of screening?
6	What are the costs of screening?
7	What are the harms of treatment?
8	What are the costs of treatment?

Appendix Table 2. Inclusion and Exclusion Criteria

Element	Inclusion Criteria	Exclusion Criteria
Databases	MEDLINE®, PsycINFO	Other databases
Languages	English only	Other languages
Populations	Humans only	Animal studies
Study design	Randomized controlled trials; cross-sectional studies; cohort studies; systematic reviews; and meta-analyses	Case-control studies, letters, editorials, and nonsystematic reviews
Study population	Screening: primary care	Screening: community settings and psychiatric settings
	Treatment: primary or specialty care	Treatment: community settings

Appendix Table 3. Literature Search Results

Category and Step	Search Strategy	Number of Articles in: MEDLINE®	PsycINFO
	Screening	**MEDLINE®**	**PsycINFO**
1	Explode suicide/or explode suicide, attempted	24,512	17,269
2	Explode mass screening	51,454	15,074
3	1 and 2	83	456
4	Total unduplicated records from both databases	250	
	Met inclusion criteria	1*	
	Randomized Controlled Trials of Suicide Treatments	**MEDLINE®**	**PsycINFO**
1	Explode (suicide/or explode suicide, attempted) and (explode randomized controlled trial/explode single-blind or double-blind method/explode random allocation)	72	0
2	Explode suicide/or explode suicide, attempted	26,541	17,269
3	Limit 2 to randomized controlled trial	123	0
4	1 or 3	215	0
5	Randomized controlled trial	110,121	727
6	1 and 2 and 5	215	7
7	Limiting to human and English language, total unduplicated records from both databases	222	
	Met inclusion criteria	33	
	Cohort Studies of Treatment	**MEDLINE®**	**PsycINFO**
1	Explode suicide/or explode suicide, attempted	26,780	17,269
2	Limit 1 to (human and English language)	19,492	NA
3	Explode therapeutics/ or treatment.mp	2,561,983	226,733
4	2 and 3	2,249	NA
5	Explode cohort studies	438,625	6,861
6	4 and 5	522	109
7	Total unduplicated records from both databases	507	
	Met inclusion criteria	4	
	Primary Care Reviews and Meta-Analyses	**MEDLINE®**	**PsycINFO**
1	Primary care reviews or meta-analyses	54	47
2	Total unduplicated records from both databases	54	
	Met inclusion criteria	2	

* One additional article abstracted; see text.

NA, not applicable.

AHRQ Pub. No. 04-0540-B
May 2004